

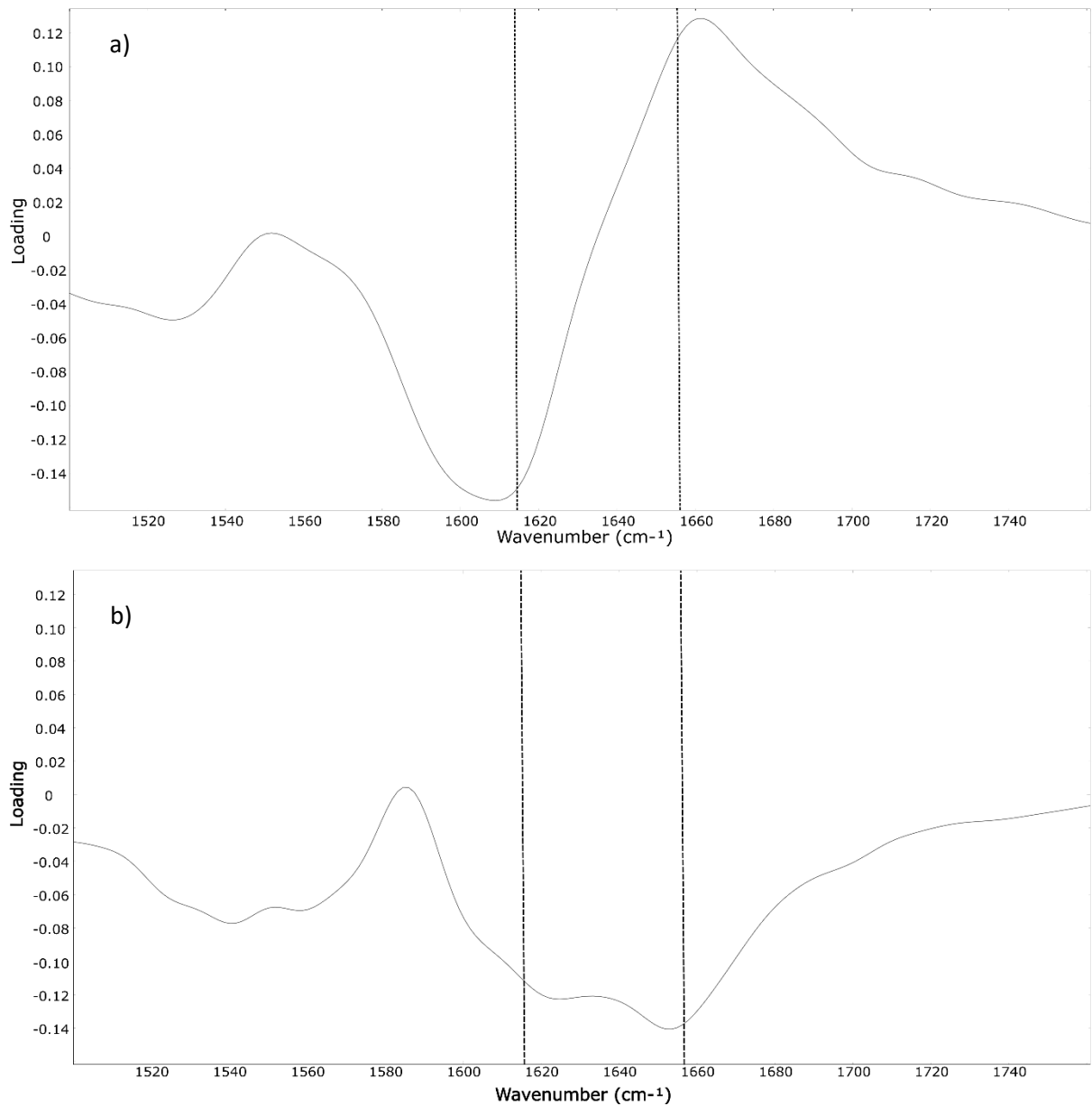
Supplementary material

Sample	Time after inoculation (days)	Cell concentration (CFU/mL)
Aguas Zarcas	0	$3.27 \times 10^4 \pm 2.91 \times 10^3$
Aguas Zarcas	14	$2.18 \times 10^4 \pm 1.04 \times 10^4$
Aguas Zarcas	33	$2.92 \times 10^5 \pm 2.84 \times 10^5$
Control A	0	$2.90 \times 10^4 \pm 2.36 \times 10^3$
Control A	14	$3.38 \times 10^6 \pm 1.92 \times 10^5$
Control B	0	$3.60 \times 10^4 \pm 3.18 \times 10^3$
Control B	14	$4.22 \times 10^6 \pm 8.38 \times 10^5$
Control C	0	$3.35 \times 10^4 \pm 2.29 \times 10^3$
Control C	14	$2.33 \times 10^6 \pm 2.19 \times 10^5$

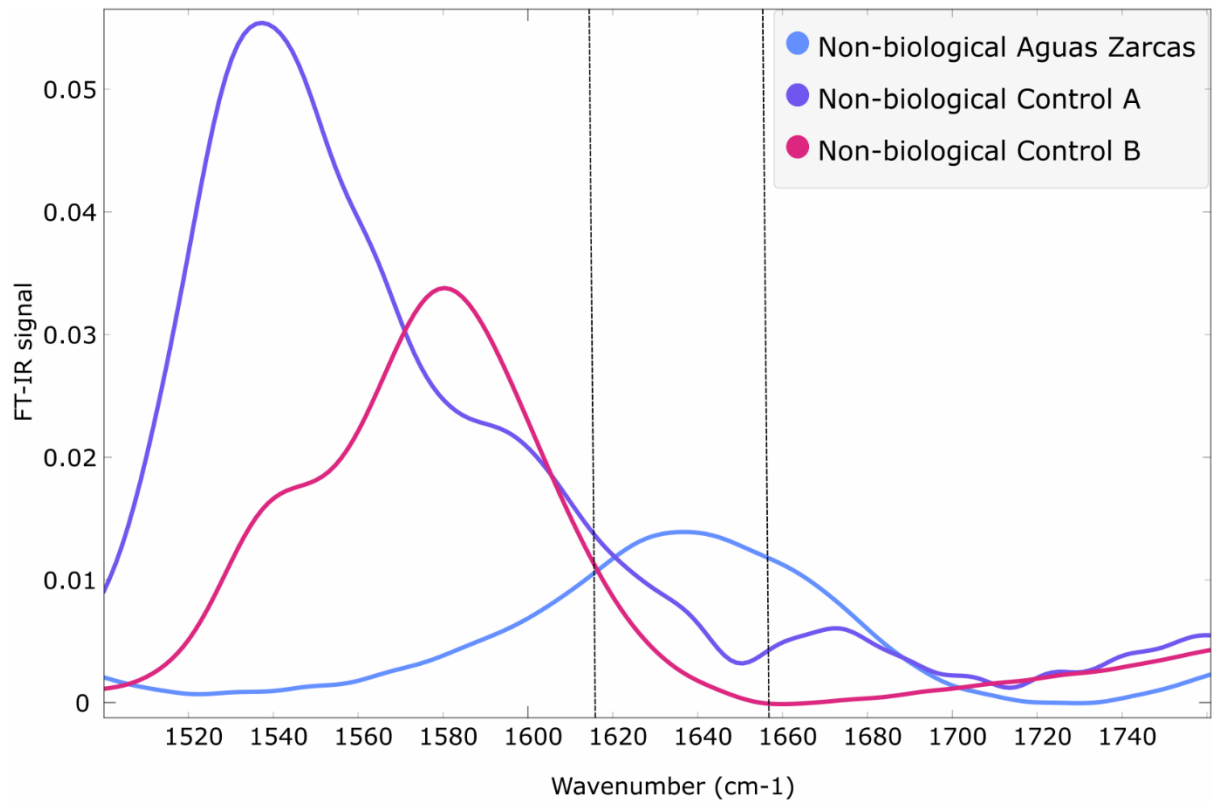
Supplementary Table 1: Microbial growth on the carbonaceous chondrite Aguas Zarcas. Colony-forming unit (CFU) counts in microcosms containing Aguas Zarcas, Control A (containing double ^{13}C -labelled sodium acetate), Control B (non-labelled sodium acetate) and Control C (containing no carbon source) throughout the experiment. Values are means with standard deviations shown from three replicates.

Sample	pH
Aguas Zarcas before	8.38 ± 0.19
Aguas Zarcas after	8.15 ± 0.34
Control A before	7.09 ± 0.01
Control A after	7.04 ± 0.15
Control B before	7.09 ± 0.02
Control B after	7.01 ± 0.20
Control C before	6.73 ± 0.23
Control C after	7.30 ± 0.17
Starting culture before	7.09 ± 0.01
Starting culture after	7.11 ± 0.01
Non-biological Aguas Zarcas before	8.55
Non-biological Aguas Zarcas after	8.34
Non-biological Control A before	7.11 ± 0.01
Non-biological Control A after	7.10 ± 0.02
Non-biological Control B before	7.11 ± 0.01
Non-biological Control B after	7.11 ± 0.04
Non-biological Control C before	6.78 ± 0.24
Non-biological Control C after	6.51 ± 0.07

Supplementary Table 2: pH of microcosms. pH results of the biological and non-biological microcosms before inoculation and 14 days after inoculation (mean \pm standard deviation). All conditions were tested in triplicate, except for non-biological Aguas Zarcas, which was tested once.



Supplementary Figure 1: Principal component (PC) loading plots showing the influence of carbon source isotopes on bacterial separation in principal component analysis (PCA). Principal component (PC) loadings contribution from the PCA of the biological samples (figure 2) for a) PC1 and b) PC2. Vertical dotted lines show the positions of the amide I bands originating from the carbonyl vibrations containing either ¹²C (1657 cm⁻¹) or ¹³C (1616 cm⁻¹).



Supplementary Figure 2: Growth medium and Aguas Zarcas meteorite do not contribute to amide I peaks. Fourier transform infrared (FT-IR) spectroscopy results of non-biological samples from 1500 to 1760 cm^{-1} . No peaks are observed at the amide I peaks for ^{12}C (1657 cm^{-1}) and ^{13}C (1616 cm^{-1}), indicated by vertical dotted lines.